Zoological Record

Vol. 92, Sect. 14, 1955

PROTOCHORDATA

COMPILED BY

D. B. CARLISLE, M.A., D.Phil.

LONDON

PUBLISHED BY

THE ZOOLOGICAL SOCIETY OF LONDON

PRICE TWO SHILLINGS

June, 1957

SEPARATE SECTIONS OF THE ZOOLOGICAL RECORD

In addition to the complete bound volume, the separate Sections may be obtained singly, bound in printed paper covers.

The following are the Sections and their prices, viz. :—

		s.	d.
1.	Comprehensive Zoology	3	0
2.	Protozoa	10	0
3.	Porifera	2	0
4.	Coelenterata	4	0
5.	Echinoderma	4	0
6.	Vermes	10	0
7.	Brachiopoda	4	0
8.	Bryozoa	2	6
9.	Mollusca	10	0
10.	Crustacea	6	6
11.	Trilobita	5	0
12.	Arachnida	10	0
*13.	Insecta	50	0
14.	Protochordata	2	0
15.	Pisces	8	6
16A.	Amphibia	6	0
16B.	Reptilia	7	6
17.	Aves	10	0
18.	Mammalia	10	0
19.	List of New Genera and Subgenera	4	0

* Obtainable only from the Commonwealth Institute of Entomology, 56 Queen's Gate, London, S.W.7.

14. PROTOCHORDATA

INCLUDING

ENTEROPNEUSTA, PTEROBRANCHIA, POGONOPHORA AND PHORONIDEA

BY

D. B. CARLISLE, M.A., D.Phil.

1.—TITLES

In the list of titles the year has been omitted where it is the same as the volume year of the "Record," namely (1955).

Abbott, D. P. (**1**) Asexual reproduction in the colonial ascidian *Metandrocarpa taylori* Huntsman. Univ. Calif. Publ. Zool. **61** 1953: 1–78 14 pls. 5 figs.

Abbott, D. P. (**2**) Larval structure and activity in the ascidian *Metandrocarpa taylori*. J. Morph. **97**: 569–594 2 pls. 3 figs.

Abbott, D. P. *see* Light *et al.*

Aldrich, F. A. A new symbiotic relationship involving *Molgula manhattensis* (De Kay) and *Mya arenaria* L. Notul. nat. Acad. Philad. No. **274**: 1–3 1 fig.

Beklemishev, V. Osnoy sravniteljnoj anatomiji bespozvonocnih [Foundations of comparative anatomy of invertebrates]. Moscow. 1952.

Bell, L. G. E. (**1**). Production of abnormal metamorphosis in a tunicate. Nature, Lond. **175**: 1001 1 fig.

Bell, L. G. E. (**2**). Effect of chloretone on tunicate embryos. Nature, Lond. **175**: 1048.

Bernard, M. F. Capture de *Megalocercus abyssorum* Chun (Oikopleuridae) dans la baie d'Alger. Bull. Soc. Hist. nat. Afr. N. **45**: 344–347 2 figs.

Berner, L. D. Two new pelagic tunicates from the eastern Pacific ocean. Pacif. Sci. **9**: 247–253 8 figs.

Berrill, N. J. The origin of vertebrates. Oxford pp. viii + 256 31 figs

Bertrand, D. Le vanadium et le molybdène dans les prochordés. C.R. Acad. Sci. Paris **240**: 2356–2357.

Björnberg, T. K. S. Nota prévia sôbre a ocorrência de Tornárias na costa sul do Brasil. [Brief note on the occurrence of Tornaria on the coast of Brazil]. English abstract. Arch. Mus. paranaen. **10** 1954: 345–350 2 pls.

Björnberg, T. K. S. *see* Moure *et al.*

Caullery, M. (**1**). Sur les Siboglinidae, type nouveau d'Invertébrés receulli par l'expédition du Siboga. C.R. Acad. Sci. Paris **158** 1914: 2014–2016.

Caullery, M. (**2**). *Siboglinum* Caullery 1914, type nouveau d'Invertébrés d'affinités à préciser. Siboga Exped. **25 bis** 1944: 1–26 89 figs.

Caullery, M. (**3**). Le genre *Siboglinum* Caullery 1914: Traité de Zoologie (ed. P. P. Grassé) **11** 1948: 494–499.

Caullery, M. (**4**). À propos des considérations de M. Constantin Dawydoff sur les affinités de *Siboglinum*. Bull biol. **82** 1948: 164–165.

Colwin, A. L. *see* Colwin, L. H.

Colwin, L. H. & **Colwin,** A. L. Fertilization changes in the membranes and cortical granular layer of the egg of *Saccoglossus kowalevskii* (Enteropneusta). J. Morph. **95** 1954: 1–46 75 figs.

Dawydoff, C. (**1**). Contribution a l'étude des Invertébrés de la faune marine benthique de l'Indochine. Bull. biol. Suppl. No. **37** 1953 : 1–158 2 maps.

Dawydoff, C. (**2**). Contribution a la connaissance de *Siboglinum*. Bull. biol. **82** 1948: 141–163 12 figs.

Durchan, H. *see* Lafon *et al.*

Ebara, A. The periodic reversal of the heart beat in *Salpa fusiformis*. Sci. Rep. Tokyo Bunrika Daig. **7B** 110 1954: 199–209 2 figs.

Endean, R. (**1, 2, 3**). Studies of the blood and tests of some Australian ascidians. I. The blood of *Pyura stolonifera* (Heller). II. The test of *Pyura stolonifera* (Heller). III. The formation of the test of *Pyura stolonifera* (Heller). Aust. J. Mar. Freshw. Res. **6**: 35–59 6 figs., 139–164 4 pls. 5 figs.

Farinella-Ferruzza, N. Lo sviluppo embrionale delle ascidie dopo trattamento con LiCl. Pubbl. Staz. zool. Napoli **26** : 42–54 6 figs.

Fidler, J. H. *see* Wagstaffe, R.

Fraser, J. H. (**1**). Warm-water species in the plankton off the English Channel entrance. J. mar. biol. Ass. U.K. **33** 1954: 345–346.

Fraser, J. H. (**2**). The salp *Ritteriella* of the English coast—a correction. J. mar. biol. Ass. U.K. **34** : 247–248.

Ganguly, D. N. *see* Mookerjee *et al.*

Godeaux, J. (**1**). Observations sur la glande pylorique des Thaliacés. Ann. Soc. zool. Belg. **85**: 103–118 3 figs.

Godeaux, J. (**2**). Stades larvaires du *Doliolum*. Bull. Acad. Belg. Cl. Sci. **41**: 769–787 figs.

Gravier, R. Ascidies recoltées par le "Président Théodore Tissier" (Campagne de printemps 1951). Rev. Trav. Off. Pêches marit. **19**: 611–631 2 pls.

Gupta, Gitika Datta *see* Mookerjee *et al.*

Hadži, J. A recontruction of animal classification. Syst. Zool. **2** 1953: 145–154.

Hartman, O. (**1**). Pogonphora Johansson 1938. Syst. Zool. **3** 1954: 183–185.

Hartman, O. (**2**). Quantitative survey of the benthos of San Pedros Basin, Southern California. Part 1. Preliminary results. Allan Hancock Pacif. Exped. **19**: 1–150 9 pls.

Hartman, O. (**3**). Fabricinae in the Pacific. Pacif. Sci. **5** 1951: 379–380.

Hilly, J., **Termier,** H. & **Termier,** G. Sur l'existence de Ptérobranches buissonnants dans le Burdigalien de la Kabylie de Collo (Algérie, department de Constantine). C.R. Soc. géol. Fr. **5** 1953 : 78–80.

Hiran, J. W. & **Joshi,** J. V. Distribution of sulphur and nitrogen in *Sepia* and *Rhabdocynthia*. J. Univ. Bombay N.S. **21A**: 72–73.

Horibata, T. *see* Yamazi, I.

Ivanov, A. V. (**1**). O prinadlezhnosti roda *Siboglinum* Caullery K Klassu Pogonophora [On the affiliation of the genus *Siboglinum* Caullery with the class Pogonophora]. In Russian. C.R. Acad. Sci. URSS **76** 1951: 731.

Ivanov, A. V. (**2**). Novyie Pogonophora Dalnevostochnykh Morei [New Pogonophora from Far Eastern Seas]. Zool. Zh. **31** 1952: 372–391.

Ivanov, A. V. (**3**). New Pogonophora from Far Eastern Seas [A translation of Ivanov (**2**)]. Syst. Zool. **3** 1954: 69–79 8 figs.

Ivanov, A. V. (**4**). Novyj Predstavitel Klassa Pogonophora [A new representative of the class Pogonophora]. Zool. Ah. **28** 1949: 79–84 2 figs.

Ivanov, A. V. (**5**). Pogonophora. In [Atlas of Invertebrates from Far Eastern Seas U.S.S.R.] Moscow 1955: 222–229.

Ivanov, A. V. (**6**). Osnovnyie tcherty Organizazii Pogonophora [The main features of the organisation of the Pogonophora]. C.R. Acad. Sci. URSS **100**: 175–177 1 fig.

Ivanov, A. V. (**7**). The main features of the organization of Pogonophora [A translation of Ivanov (**6**)]. Syst. Zool. **4**: 170–174 1 fig.

Ivanov, A. V. (**8**). O naruzhnom pishtchevarenii u Pogonophora [On external digestion in Pogonophora]. C.R. Acad. Sci. URSS **100**: 381–383 2 figs.

Ivanov, A. V. (**9**). On external digestion in Pogonophora [A translation of Ivanov (**8**)]. Syst. Zool. **4**: 174–176 2 figs.

Ivanov, A. V. (**10**). O prinadlezhnosti klassa Pogonophora k osobomu Utoritchnorotych — Brachiata, A. Ivanov, phylum nov. [On the assignment of the class Pogonophora to a separate phylum of Deuterostomia— Brachiata A. Ivanov, phylum nov.]. C.R. Acad. Aci. URSS **100**: 595–596.

Ivanov, A. V. (**11**). On the assignment of the class Pogonophora to a separate phylum of Deuterostomia— Brachiata A. Ivanov. phyl. nov. [A translation of Ivanov (**10**)]. Syst. Zool. **4**: 177–178.

Ivanova-Kazas, O. M. [Some observations on the development of *Botrylloides carnosus* Oka]. Trav. Soc. Nat. Leningr. **72** 1952: 141–164 12 figs.

Iwata, F. *see* Uchida, T.

Jørgensen, C. B. (**1**). On the relation between water transport and food requirements in some marine filter feeding invertebrates. Biol. Bull., Woods Hole **103** 1952: 356–363 4 figs.

Jørgensen, C. B. (**2**). Quantitative aspects of filter feeding in invertebrates. Biol. Rev. **30**: 391–454 13 figs.

Joshi, J. V. *see* Hiran, J. W.

Lafon, M., **Durchon,** M. & **Saudray,** Y. Recherches sur les cycles saisonniers du plankton. Ann. Inst. océanogr., Paris N.S. **31**: 125–230.

Lévi, C. Inventaire de la faune marine de Roscoff. Tuniciers. Trav. Sta. biol. Roscoff N.S. **6 suppl. 7**: second pagination 1–19.

Liebman, E. On trephocytes and trephocytosis; a study on the role of leucocytes in nutrition and growth. Growth **10** 1946: 219–230 10 figs.

Light, S. F., **Smith,** R. I., **Pitelka,** F. A., **Abbott,** D. P. & **Weesner,** F. M. Intertidal invertebrates of the central Californian coast. Berkeley and Los Angeles (University of California Press) 1954 pp. xiv + 445 138 figs. (Tunicates pp. 298–310).

McGinitie, G. E. Distribution and ecology of the marine invertebrates of Point Barrow, Alaska. Smithson. misc. Coll. **129**: 1–201 8 pls.

Mancuso, V. *see* Waddington, C. H.

Mayer, G. *Balanoglossites eurystomus* Mägdef. und andere Lebensspuren aus dem Unteren Hauptmuschelkalk (Trochitenkalk) von Bruchsal. Jber. oberrhein. geol. Ver. NF**33** 1953: 126–132 1 pl. 2 figs.

Medawar, P. B. The significance of inductive relationships in the development of vertebrates. J. Embryol. exp. Morph. **2** 1954: 172–174.

Millar, R. H. (**1**). Ascidiacea. Rep. Sw. Deep-Sea Exped. **2**: 221–236 7 figs.

Millar, R. H. (**2**). On a collection of ascidians from South Africa. Proc. zool. Soc. Lond. **125**: 169–221 38 figs.

Millar, R. H. (**3**). *Protostyela heterobranchia* n. gen., n. sp., a styelid ascidian from the Scottish west coast. J. mar. biol. Ass. U.K. **33** 1954: 677–679 1 fig.

Millar, R. H. (**4**). The breeding and development of the ascidian *Pelonaia corrugata* Forbes & Goodsir. J. mar. biol. Ass. U.K. **33** 1954: 681–687 3 figs.

Mookerjee, H. K., **Ganguly,** D. N. & **Gupta,** Gitika Datta. On the study of the central nervous system, axial skeleton and anterior metamerism of the balanoglossid *Ptychodera* sp., and their bearing on the phylogeny of chordates. Anat. Anz. **102**: 153–165 2 pls. 11 figs.

Mortelmas, G. Découverte d'un Ptérobranche *Rhabdopleura delmeri* nov. sp., dans le Viséen terminal du sondage de Turnhout. Bull. Soc. belg. Géol. Pal. Hydr. **64**: 52–66 5 figs.

Moure, J. S., **Björnberg,** T. K. S. & **St. Loureiro,** T. Protochordata ocorrêntes na entrada da Baía de Paranaguà [Protochordata occurring at the entrance to the Bay of Paranagua]. Dusenia **5** 1954: 233–242.

Name, W. G. van. Reports of the Lund University Chile Expedition 1948–49. 14 Ascidians (Ascidiacea). Acta Univ. lund. N.F. Avd. 2 **50**: 1–20.

Okuda, S. & **Yamada,** M. (**1**). Notes on Tornaria larvae from Akkeshi Bay. Annot. zool. jap. **28**: 40–43 2 figs.

Okada, S. & **Yamada,** M. (**2**). The fauna of Akkeshi Bay. XXIII. Enteropneusta. Publ. Akkeshi mar. biol. Sta. **6**: 1–7.

Olsson, R. Structure and development of Reissner's fibre in the caudal end of *Amphioxus* and some lower vertebrates. Acta zool. Stockh. **36**: 167–198 21 figs.

Ortolani, G. (**1**). I movimenti corticali dell'uovo di ascidie alla fecondazione [English summary]. Riv. Biol. N.S. **47**: 169–179 26 figs.

Ortolani, G. (**2**). The presumptive territory of the mesoderm on the ascidian germ. Experientia **11**: 445–446 figs.

Østvedt, O. J. Zooplankton investigations from the weather ship M in the Norwegian Sea, 1948–49. Hvalråd. Skr. **40**: 1–93 25 figs.

Pérès, J. M. Sur une ascidie nouvelle recoltée dans la gravelle de Castiglione (*Heterostigma gravellophila* nov. sp.). Bull. Sta. Aguic. Pêche Castiglione (N.S.) **7**: 297–303 4 figs.

Pitelka, F. A. *see* Light *et al.*

Poper, E. C. Pyrosome plagues in surf. Aust. Mus. Mag. **11**: 395–396 1 fig.

Rao, K. P. (**1**). Morphogenesis during regeneration in an enteropneust. J. anim. Morph. Physiol. **1** (2): 1–7 10 figs.

Rao, K. P. (**2**). Tornaria from Madras (Enteropneusta). Hydrobiologia **7**: 269–278 2 pls.

Sabbadin, A. (**1**). La linea sanguigna in *Botryllus schlosseri* (Pallas). Boll. Zool. Torino **21** 1954: 171–172.

Sabbadin, A. (**2**). Osservazioni sullo sviluppo, l'accrescimento e la riproduzione di *Botryllus schlosseri* (Pallas) in condizioni di laboratorio. Boll. Zool. Torino **22**: 243–263 1 pl. 5 figs.

Sabbadin, A. (**3**). Il ciclo biologico di *Botryllus schlosseri* (Pallas) (Ascidiacea) nella Laguna di Venezie. Arch. Oceanogr. Limnol. **10**: 217–230 1 pl. 6 figs.

Sabbadin, A. (**4**). Studio sulle cellule del sangue di *Botryllus schlosseri* (Pallas) Ascidiacea. Arch. ital. Anat. Embriol. **60**: 33–67 12 figs.

St. Loureiro, T. *see* Moure *et al.*

Saudray, Y. *see* Lafon *et al.*

Sébastian, V. O. *Perophora listeri indica* var. nova a new ascidian from the Madras coast of India. Zool. Anz. **154**: 266–268 1 fig.

Silén, L. (**1**). Reflections concerning the " stomochord " of the Enteropneusta. Proc. zool. Soc. Lond. **124** 1954: 63–67.

Silén, L. (**2**). On the nervous system of *Phoronis*. Ark. Zool. **6** (1) 1954: 1–40 32 figs.

Silén, L. (3). Autotomized tentacle crowns as propagative bodies in *Phoronis*. Acta zool. Stockh. **36**: 159–165 4 figs.

Smith, R. I. *see* Light *et al.*

Suzuki, Y. Biochemical studies of the ascidian *Cynthia roretzi* v. Drasche. I. On the nitrogenous extracts. Tohoku J. agr. Res. **6**: 85–89.

Termier, G. *see* Hilly *et al.*

Termier, H. *see* Hilly *et al.*

Tokioka, T. (**1**). Contributions to Japanese ascidian fauna, XI. Sporadic memoranda (2). Publ. Seto mar. biol. Lab. **4**: 205–218 4 pls. 5 figs.

Tokioka, T. (**2**). Record of *Styela clava* Herdman from European waters. Zool. Mag. Tokyo **64**: 200.

Tokioka, T. (**3**). General considerations on Japanese appendicularian fauna. I. Species occurring in Japanese waters and the neighbouring seas. Publ. Seto mar. biol. Lab. **4**: 251–261 6 figs.

Tokioka, T. (**4**). Ascidians from the Palao Islands II. Publ. Seto mar. biol. Lab. **5**: 43–57 6 pls.

Tokioka, T. (**5, 6**). Droplets from the plankton net. XVII. A small collection of pelagic tunicates from the North Eastern part of the Indian Ocean. XVIII. Short notes on a few appendicularians collected in the " Kurosio " off Siono-Misaki. Publ. Seto mar. biol. Lab. **5**: 75–78 3 figs. and 78–80 2 figs.

Torrey, T. W. *Balanoglossus* and the origin of the vertebrate nephros. Proc. Ind. Acad. Sci. **61** 1952: 296–304 5 figs.

Uchida, T. & **Iwata,** F. The fauna of Akkeshi Bay. XXII. Phoronidea. Publ. Akkeshi mar. biol. Sta. No. **6**: 1–3 2 figs. 1 pl.

Ulrich, W. Über die systematische Stellung einer neuen Tierklasse (Pogonofora K. E. Johansson), den Begriff der Archicoelomaten und die Einteilung der Bilsterien. S. B. dtsch. Akad. Wiss. **1949** (2) 1950: 1–25.

Varnay, S. Recherches sur le cycle saisonnier de *Synoicum argus* (Milne Edwards), Synascidie Polyclinidée. Bull. Lab. marit. Dinard No. **41**: 36–53 11 figs.

Waddington, C. H. & **Mancuso,** V. The effects of some purines and purine-analogues on ascidian embryos Exp. Cell Res. **9**: 369–371.

Wagstaffe, R. & **Fidler,** J. H. The preservation of natural history specimens. Vol. I. Invertebrates. London, pp. xiii× 205.

Weesner, F. M. *see* Light *et al.*

Wood, E. J. F. Effect of temperature and rate of flow on some marine fouling organisms. Aust. J. Sci. **18**: 34–37 6 figs.

Woodwick, K. A list of the Enteropneusta identified from samples of the benthos of San Pedros Basin, California. Allan Hancock Pacif. Exped. **19**: 166–167.

Yamada, M. *see* Okuda, S.

Yamazi, I. (**1, 2, 3**). Plankton investigation in inlet waters along the coast of Japan. VIII. The plankton of Miyazu Bay in relation to the water movement. XVI. The plankton of Tokyo Bay in relation to the water movement. XVII. Seasonal succession of zooplankton in the inner area of Tanabe Bay from June to October 1954. Publ. Seto mar. biol. Lab. **4**: 269–284 16 figs., 285–308 2 pls. 22 figs. and 311–320 9 figs.

Yamazi, I. & **Horibata,** T. Plankton investigation in inlet waters along the coast of Japan. XVIII. Seasonal succession of plankton in Taizi Bay in the years 1951–1953. Publ. Seto mar. biol. Lab. **4**: 321–336 2 pls. 12 figs.

II.—SUBJECT INDEX

References to the "Titles" is by the name(s) of the Author(s).

ALL GROUPS

GENERAL

Textbooks.—Beklemishev; Wagstaffe & Fidler.

Collections, fauna lists.—Benthos of Indochina: Dawydoff (**1**).

STRUCTURE

Laboratory technique. — Wagstaffe & Fidler.

EVOLUTION

Phylogeny.—Hadži.

POGONOPHORA

GENERAL

Collections.—Ivanov (**2, 3**).

STRUCTURE

Adults.—Caullery (**2, 3**); Dawydoff (**2**); Ivanov (**1–11**).

PHYSIOLOGY

Feeding mechanisms.—Ivanov (**8, 9**).

EVOLUTION

Phylogeny. — Beklemishev; Caullery (**2, 3, 4**); Dawydoff (**2**); Hartman (**1**); Ivanov (**1–11**); Ulrich.

ECOLOGY & HABITS

Distribution.—Ivanov (**5**).

DISTRIBUTION

MARINE

NORTH TEMPERATE. — West Pacific: Ivanov (**1–11**).

PHORONIDEA

GENERAL

Fauna lists.—Uchida & Iwata.

STRUCTURE

Nervous system.—SILÉN (2).

Cytology.—SILÉN (2).

PHYSIOLOGY

Nervous system, senses.—SILÉN (2).

REPRODUCTION

Asexual.—SILÉN (3).

Effects of environment.—SILÉN (4).

Breeding season.—UCHIDA & IWATA.

ECOLOGY & HABITS

Distribution.—LIGHT *et al.*

Population studies.—LIGHT *et al.*

Ecology.—HARTMAN (2).

DISTRIBUTION

MARINE

NORTH TEMPERATE. — East Pacific: LIGHT *et al.*; West Pacific: UCHIDA & IWATA.

PTEROBRANCHIA

ECOLOGY & HABITS

Ecology.—DAWYDOFF (1).

DISTRIBUTION

MARINE

TROPICAL. — Indian Ocean: DAWYDOFF (1).

GEOLOGICAL

Fossils.—HILLY *et al.*

ENTEROPNEUSTA

GENERAL

Fauna lists.—OKUDA & YAMADA (2); WOODWICK.

STRUCTURE

Adults.—SILÉN (1).

Larva, post-larva.—OKUDA & YAMADA (1).

Endoskeleton. — MOOKERJEE *et al.*

Excretory system.—TORREY.

Nervous system.—MOOKERJEE *et al.*

Homology.—TORREY; of stomochord: SILÉN (1).

PHYSIOLOGY

Regeneration.—RAO.

DEVELOPMENT

Egg, oogenesis: COLWIN & COLWIN.

Fertilization: COLWIN & COLWIN.

Organogeny: RAO.

Larval stages: OKUDA & YAMADA (1).

Metamorphosis: OKUDA & YAMADA (1); RAO (2).

EVOLUTION

Phylogeny.—MOOKERJEE *et al.*

ECOLOGY & HABITS

Distribution. — HARTMAN (2); LIGHT *et al.*

Population studies. — DAWYDOFF (1); HARTMAN (2); LIGHT *et al.*

Ecology.—DAWYDOFF (1); HARTMAN (2).

DISTRIBUTION

MARINE

NORTH TEMPERATE. — East Pacific: HARTMAN (2); LIGHT *et al.*; West Pacific: OKUDA & YAMADA (2).

GEOLOGICAL

Fossils.—MAYER.

TUNICATA

GENERAL LITERATURE & HISTORY

Textbooks.—BERRILL.

Collections. — MILLAR (1, 2); MOURE *et al.*; NAME; TOKIOKA (3, 4).

Fauna lists.—LÉVI.

Food for man.—SUZUKI.

STRUCTURE

Adults.—Ascidiacea: ABBOTT (2); MILLAR (2); Thaliacea: BERNER.

Larva, post-larva. — Ascidiacea: ABBOTT (2); MILLAR (2); Thaliacea: GODEAUX (2).

Exoskeleton: Ascidiacea: ENDEAN (2).

Excretory system. — Thaliacea: GODEAUX (1).

Circulation and blood.—Ascidiacea: ENDEAN (1); SABBADIN (2).

Biochemistry. — Ascidiacea: BERTRAND; ENDEAN (1, 2); HIRAN & JOSHI.

Cytology.—Ascidiacea: SABBADIN (2).

PHYSIOLOGY

Feeding mechanisms.—Ascidiacea: JØRGENSEN (1, 2); LIEBMAN; Thaliacea: JØRGENSEN (2); Larvacea: JØRGENSEN (2).

Circulation. — Ascidiacea: LIEBMAN; Thaliacea: EBARA.

Excretion. — Thaliacea: GODEAUX (1).

Growth.—Ascidiacea: LIEBMAN.

Biochemistry. — Ascidiacea: BERTRAND; ENDEAN (1, 2); SUZUKI.

Pigments. — Ascidiacea: BERTRAND; ENDEAN (1).

Effects of environment.—Ascidiacea: SABBADIN (2).

REPRODUCTION

Asexual.—ABBOTT (1); SABBADIN (3).

Sexual.—SABBADIN (3).

Oviparity. — Ascidiacea: MILLAR (4).

Ovoviviparity. — Ascidiacea: ABBOTT (2).

Breeding season. — Ascidiacea: ABBOTT (2); MILLAR (4); SABBADIN (2, 3).

Parturition. — Ascidiacea: ABBOTT (2).

DEVELOPMENT

Egg, oogenesis.—Ascidiacea: ORTOLANI (2).

Fertilization. — Ascidiacea: ORTOLANI (1).

Embryology. — Ascidiacea: IVANOVA-KAZAS.

Chemical embryology. — Ascidiacea: FARINELLA-FERUZZA; MEDAWAR; WADDINGTON & MANCUSO.

Organogeny.—Ascidiacea: ABBOTT (1); FARINELLA-FERUZZA; test; ENDEAN (3); blood cells: ENDEAN (1); SABBADIN (4).

Larval stages.—Ascidiacea: ABBOTT (2); IVANOVA-KAZAS; MILLAR (4); Thaliacea: GODEAUX (2).

Metamorphosis. — Ascidiacea: ABBOTT (2); BELL (1, 2); MILLAR (4).

Life History. — Ascidiacea: ABBOTT (2); SABBADIN (2).

Growth.—Ascidiacea: ABBOTT (1); SABBADIN (3).

Effects of environment.—Ascidiacea: BELL (1, 2); SABBADIN (2, 3).

Teratology. — Ascidiacea: BELL (1); FARINELLA-FERUZZA.

EVOLUTION

Phylogeny. — Ascidiacea: ABBOTT (2); BERRILL.

ECOLOGY & HABITS

Annual cycle.—Ascidiacea: SABBADIN (2, 3); VERNAY; Thaliacea: LAFON *et al.*; Larvacea: LAFON *et al.*; YAMAZI (3); YAMAZI & HORIBATA.

Distribution. — Ascidiacea: LÉVI; LIGHT *et al.*; MACGINITIE; MILLAR (2, 4); MOURE *et al.*; NAME.

Population studies. — Ascidiacea: ALDRICH; DAWYDOFF (1); LÉVI; LIGHT *et al.*; SABBADIN (3); YAMAZI (2); Thaliacea: LAFON *et al.*; YAMAZI (1); Larvacea: LAFON *et al.*; LÉVI; ØSTVEDT; YAMAZI (1–3); YAMAZI & HORIBATA.

Ecology. — Ascidiacea: DAWYDOFF (1); HARTMAN (2); MCGINITIE; YAMAZI (2); Thaliacea: LAFON *et al.*; YAMAZI (1); Larvacea: LAFON *et al.*; YAMAZI (1–3); YAMAZI & HORIBATA.

Fouling.—Ascidiacea: WOOD.

Nuisance value. — Ascidiacea: WOOD; Thaliacea: POPER.

DISTRIBUTION

MARINE

ARCTIC — Ascidiacea: MACGINITIE.

NORTH TEMPERATE. — East Atlantic: Ascidiacea: LÉVI; MILLAR (4); Thaliacea: FRASER (1, 2); ØSTVEDT; Larvacea: LÉVI; ØSTVEDT; West Atlantic: Ascidiacea: GRAVIER; MILLAR (4); Mediterranean: Larvacea: BERNARD; East Pacific: Ascidiacea: LIGHT *et al.*; West Pacific: Ascidiacea: YAMAZI (2); Thaliacea: YAMAZI (1); Larvacea: TOKIOKA (3, 6); YAMAZI (1–3); YAMAZI & HORIBATA.

TROPICAL. — Atlantic: Ascidiacea: GRAVIER; Indian Ocean: Ascidiacea: DAWYDOFF (1); Thaliacea & Larvacea: TOKIOKA (5); East Pacific: Thaliacea: BERNER; West Pacific: Ascidiacea: TOKIOKA (4).

SOUTH TEMPERATE. — Ascidiacea: MILLAR; NAME; Thaliacea: POPER.

BATHYMETRIC. — Ascidiacea: MILLAR (1); Larvacea: Østvedt.

CEPHALOCHORDATA

GENERAL HISTORY & LITERATURE

Collections.—MOURE *et al.*

STRUCTURE

Nervous system.—Reissner's fibre: OLSSON.

PHYSIOLOGY

Feeding mechanisms.—JØRGENSEN (**2**).

DEVELOPMENT

Organogeny. — Reissner's fibre: OLSSON.

Metamorphosis.—BERRILL.

ECOLOGY & HABITS

Distribution.—MOURE *et al.*

Population studies. — DAWYDOFF (**1**).

Ecology.—DAWYDOFF (**1**).

DISTRIBUTION

MARINE

TROPICAL. — Indian Ocean: DAWYDOFF (**1**).

III.—SYSTEMATIC INDEX

References to the "Titles" is by the name(s) of the Author(s).

GRAPTOLITES

(Vacant)

BRACHIATA

BRACHIATA **phyl. nov.** to accommodate class Pogonophora, IVANOV (**10**) ; see also IVANOV (**11**).

POGONOPHORA

Systematic standing, ULRICH.

Athecanephria **ord. nov.**, IVANOV (**10**) p. 596 ; see also IVANOV (**11**).

Thecanephria **ord. nov.**, IVANOV (**10**), p. 596 ; see also IVANOV (**11**).

ATHECANEPHRIA

Siboglinidae **fam. nov.**, CAULLERY (**1**) ; type gen. *Siboglinum*.

SIBOGLINIDAE

Siboglinum **gen. nov.** CAULLERY (**1**) pp. 2014–2016 ; no type sp. given: affinities, CAULLERY (**2–4**) ; DAWYDOFF (**2**) ; morphology, CAULLERY (**2–4**) ; DAWYDOFF (**2**) ; a member of Pogonophora, IVANOV (**1**) ; *S. weberi* **sp. nov.** tropical Pacific CAULLERY (**2**): type sp. of *Siboglinum* Caullery 1914.

THECANEPHRIA

Polybrachiidae **fam. nov.**, IVANOV (**2**) p. 390: type gen. *Polybrachia* ; see also IVANOV (**3**).

Lamellisabellidae **fam. nov.**, IVANOV (**1**): type gen. *Lamellisabella*.

Spirobrachiidae **fam. nov.**, IVANOV (**2**) p. 390: type gen. *Spirobrachia* ; see also IVANOV (**3**).

POLYBRACHIIDAE

Polybrachia **gen. nov.**, IVANOV (**2**) pp. 379, 388: type sp. *P. annulata* ; see also IVANOV (**3**) ; *P. annulata* **sp. nov.** Behring Sea, IVANOV (**2**) pp. 379–383 figs. 13–18 ; see also IVANOV (**3**) ; *P. barbata* **sp. nov.** Behring Sea, IVANOV (**2**) pp. 383–384 figs. 19–22 ; see also IVANOV (**3**).

Birsteinia **gen. nov.**, IVANOV (**2**) pp. 377, 388: type sp. *B. vitjasi* ; see also IVANOV (**3**) ; *B. vitjasi* **sp. nov.** Behring Sea, IVANOV (**2**) pp. 377–379 figs. 7–12 ; see also IVANOV (**3**).

Heptabrachia **gen. nov.**, IVANOV (**2**) pp. 375, 387: type sp. *H. abyssicola* ; see also IVANOV (**3**) ; *H. abyssicola* **sp. nov.** Northwest Pacific, IVANOV (**2**) pp. 375–377 figs. 2–6 ; see also IVANOV (**3**).

LAMELLISABELLIDAE

Affinities, HARTMAN (**3**).

Lamellisabella gorbinovi **sp. nov.** North Pacific, IVANOV (**4**) pp. 79–84 figs. 1–2.

SPIROBRACHIIDAE

Spirobrachia **gen. nov.**, IVANOV (**2**), pp. 384, 388: type sp. *S. grandis* ; see also IVANOV (**3**) ; *S. grandis* **sp. nov.** Behring Sea, IVANOV (**2**) pp. 384–7 figs. 23–26 ; see also IVANOV (**3**).

PHORONIDEA

Phoronis, SILÉN (**2, 3**) ; *P. hippocrepia*, UCHIDA & IWATA.

PTEROBRANCHIA

Fossil, HILLY *et al.*, MORTELMAS.

CEPAHLODISCIDAE

Cephalodiscus (*Cephalodiscus*) and *C.* (*Orthoecia*) in Indochina, DAWYDOFF (**1**).

RHABDOPLEURIDAE

Rhabdopleura in Indochina, DAWYDOFF (**1**); *R. delmeri* **sp. nov.** fossil Belgium, MORTELMAS pp. 63–6 figs. 4–5.

ENTEROPNEUSTA

Of Indochina, DAWYDOFF (**1**).

Balanoglossus, TORREY.

Balanoglossites eurystomas fossil MAYER.

Glandiceps bengalensis **sp. nov.** larval form India, RAO (**2**) p. 270 figs. 1–3, 6–14.

Glossobalanus indicus **sp. nov.** India, RAO (**2**) pp. 270–2 figs. 4, 5, 18, 19.

Ptychodera flava larva described RAO (**2**).

Saccoglossus borealis **sp. nov.** Japan, OKUDA & YAMADA (**2**) pp. 2–7 figs. 1–8.

Tornaria nondescript OKUDA & YAMADA (**1**); *T. mourei* **sp. nov.** (?). Brazil, BJÖRNBERG p. 345, pl. 26 figs. 6–7; *T. lilianae* **sp. nov.** (?). Brazil, BJÖRNBERG p. 346, pl. 26 figs. 8–10; *T. stiasnyi* **sp. nov.** (?). Brazil, BJÖRNBERG p. 346, pl. 26 figs. 1–5; these three spp. are stated by Björnberg to be spp. nov, but he has already described and named them in 1953: see Zool. Rec. 91 (14), 6.

TUNICATA

ACIDIACEA

Of Indochina, DAWYDOFF (**1**).

CLAVELINIDAE

Clavelina roseola **sp. nov.** S. Africa, MILLAR (**2**) pp. 183–5 fig. 13; *C. steenbrasensis* **sp. nov.** S. Africa, MILLAR (**2**) pp. 185–7 fig. 14.

Distaplia coronata **sp. nov.** Japan, TOKIOKA (**1**) pp. 209–211 fig. 2 pl. 12 *D. mikropnoa* redescribed and figured and larva, TOKIOKA (**4**).

POLYCITORIDAE

Eudistoma illotum redescribed and figured with larva, MILLAR (**2**); *E. rigida* **sp. nov.** Palao Islands, TOKIOKA (**4**) pp. 50–51 pl. v figs. 6–10; *E. viridis* **sp. nov.** Palao Islands, TOKIOKA (**4**) pp. 49–50 pl. 4 figs. 1–5.

POLYCLINIDAE

Amaroucium antillense **sp. nov.** Antilles, GRAVIER pp. 618–9 pl. 1 figs. 4–5; *A. circulatum* redescribed and figured with larva, MILLAR (**2**); *A. erythraeum* redescribed and figured synonymy, larva, MILLAR (**2**); *A. unilarviferum* **sp. nov.** S. African shore, adult and larva, MILLAR (**4**) pp. 172–4, fig. 4.

Aplidium lobatum redescribed and figured, TOKIOKA (**4**).

Polyclinum caeruleum **sp. nov.** Guadaloupe, GRAVIER pp. 619–20, pl. 1 figs. 1–3.

Synoicum argus annual cycle, VERNAY.

DIDEMNIDAE

Didemnum stilense redescribed and figured with larva, MILLAR (**2**);

D. ternatanum redescribed and figured with larva, TOKIOKA (**4**).

Leptoclinum taxonomic standing, TOKIOKA (4).

Lissoclinum taxonomic standing, TOKIOKA (**4**), *L. bilobatum* **sp. nov.** S. Africa, MILLAR (**2**) pp. 180–1 fig. 11.

Trididemnum cerebriforme redescribed and figured with larva, MILLAR (**2**).

DIAZONIDAE

Syndiazona chinensis **sp. nov.** E. China Sea, TOKIOKA (**1**) pp. 206–8 fig. 1, pl. 11.

PEROPHORIDAE

Perophora listeri indica **var. nov.** India, SEBASTIAN pp. 266–8 figs. a, b.

AGNESIIDAE

Agnesia capensis **sp. nov.** S. Africa, MILLAR (**2**) pp. 191–3 fig. 19; *A. depressa* **sp. nov.** N.W. Atlantic abyssal, MILLAR (**1**) pp. 223–4 fig. 1.

STYELIDAE

Bathystyeloides atlantica **sp. nov.** tropical Atlantic abyssal, MILLAR (**1**) pp. 229–3 fig. 5.

Botrylloides carnosum development, IVANOVA-KAZAS.

Botryllus schlosseri first record from Chile, NAME.

Cnemidocarpa platybranchia **sp. nov.** N. Atlantic abyssal, MILLAR (**1**) pp. 226–7 fig. 3 ; *C. bathyphila* **sp. nov.** tropical Atlantic abyssal, MILLAR (**1**) pp. 228–9 fig. 4 ; *C. legalli* **sp. nov.** Antilles, GRAVIER pp. 621–2 pl. 2 figs. 8–10.

Dextrocarpa **gen. nov.**, MILLAR (**2**) p. 200: type sp. *D. solitaris* ; *D. solitaris* **sp. nov.** S. Africa, MILLAR (**2**) pp. 200–203 fig. 27.

Dicarpa **gen. nov.**, MILLAR (**1**) pp. 224–5 ; type sp. *D. simplex* ; *D. simplex* **sp. nov.** N. W. Atlantic abyssal, MILLAR (**1**) pp. 225–6 fig. 2.

Hemistyela **gen. nov.**, MILLAR (**1**) p. 231: type sp. *H. pilosa* ; *H. pilosa* **sp. nov.** tropical Atlantic abyssal, MILLAR (**1**) pp. 231–2 fig. 6.

Metandrocarpa taylori, ABBOTT (**1**, **2**).

Polyandrocarpa durbanensis **sp. nov.** S. Africa, MILLAR (**2**) pp. 197–9 fig. 25.

Polycarpa aurata redescribed and figured, synonymy, TOKIOKA (**4**).

Protostyela **gen. nov.**, MILLAR (**3**) p. 677: type sp. *P. heterobranchia* ; *P. heterobranchia* **sp. nov.** MILLAR (**3**) pp. 677–9 fig. 1.

Styela clava synonymy, TOKIOKA (**2**) ; *S. mammiculata* a synonym of *S. clava*, TOKIOKA (**2**) ; *S. marquesana* redescribed and figured, MILLAR (**2**) ; *S. aequatorialis* redescribed and figured, MILLAR (**2**).

PYURIDAE

Culeolus suhmi, MILLAR (**1**).

Heterostigma gravellophila **sp. nov.** Algeria, PÉRÈS pp. 297–203 figs. 1–4.

Microcosmus trigonimus **sp. nov.** S. Africa, MILLAR (**2**) pp. 212–4 fig. 37.

Pyura stolonifera, ENDEAN (**1**, **2**, **3**).

MOLGULIDAE

Molgula scutata **sp. nov.** S. Africa MILLAR (**2**) pp. 215–7 fig. 39 ; *M falsensis* **sp. nov.** S. Africa, MILLAR (**2**) pp. 217–8 fig. 40.

THALIACEA

PYROSOMIDA

Pyrosoma, GODEAUX (**1**) ; POPER.

DOLIOLIDA

Doliolum larvae described, GODEAUX (**2**) ; Pyloric gland, GODEAUX (**1**).

SALPIDA

Cyclosalpa pinnata quadriluminis **nom. nov.** California, BERNER p. 251 figs. 6–8 ; *C. strongylenteron* **sp. nov.** California, BERNER p. 247 figs. 1–4, 8.

Salpa fusiformis heart, EBARA.

Ritteriella picteti, FRASER (**1**, **2**) ; *R. amboinensis*, FRASER (**1**).

LARVACEA

OIKOPLEURIDAE

Oikopleura, ØSTVEDT.

Megalocercus abyssorum redescribed and figured from Algeria, BERNARD.

FRITILLARIIDAE

Fritillaria, ØSTVEDT.

CEPAHOLOCHORDATA

MOURE *et al.*